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Putative invasion of *Anax imperator* Leach in Brewster, 1815 (Odonata, Aeshnidae) to Novosibirskaya Oblast of Russia in early July 2025

Предположительная инвазия *Anax imperator* Leach in Brewster, 1815 (Odonata, Aeshnidae) в Новосибирскую область России в начале июля 2025 г.

O.E. Kosterin
О.Э. Костерин

Institute of Cytology and Genetics SB RAS, Academika Lavrentyeva Ave. 10, Novosibirsk 630090 Russia; Novosibirsk State University, Pirogova Str. 2, Novosibirsk 630090 Russia. E-mail: kosterin@bionet.nsc.ru ORCID: 0000-0001-5955-4057

Институт цитологии и генетики СО РАН, пр. Академика Лаврентьева 10, Новосибирск 630090 Россия; Новосибирский национальный исследовательский университет, ул. Пирогова 2, Новосибирск 630090 Россия.

Key words: Odonata, dragonfly, West Siberia, Novosibirskaya Oblast, first record, invasion.

Ключевые слова: Odonata, стрекоза, Западная Сибирь, Новосибирская область, первая находка, инвазия.

Abstract. *Anax imperator* Leach in Brewster, 1815 was hitherto unknown from the well studied Novosibirskaya Oblast but was once reported from the neighbouring Altaiskii Krai. Few males of *A. imperator* Leach were observed and registered photographically during 7–17 July 2025 in Novosibirskii and Iskitimskii Districts of Novosibirskaya Oblast. This dragonfly was no longer encountered during further regular monitoring of the location in the Novosibirskii District. These observations can be interpreted as evidence of an irregular short-term invasion of *A. imperator* Leach at least to the east of Novosibirskaya Oblast, supposedly from the south (e. g. from Altaiskii Krai). The protected status of *A. imperator* Leach is critically discussed. An updated checklist of 62 species of Odonata currently known from Novosibirskaya Oblast is provided.

Резюме. *Anax imperator* Leach in Brewster, 1815 до сих пор не был известен из хорошо изученной Новосибирской области, однако был однажды зарегистрирован в соседнем с ней Алтайском Крае. Несколько самцов *A. imperator* Leach наблюдались и были зарегистрированы фотографически 7–17 июля 2025 г. в Новосибирском и Искитимском районах Новосибирской области. В ходе дальнейшего регулярного мониторинга местонахождения в Новосибирском районе данный вид более не был встречен. Эти наблюдения можно интерпретировать как свидетельство нерегулярной кратковременной инвазии *A. imperator* Leach как минимум на восток Новосибирской области, предположительно с юга, например из Алтайского Края. Охраняемый статус *A. imperator* Leach обсуждается в критическом ключе. Приведён дополненный список 62 видов стрекоз, известных из Новосибирской области на данный момент.

Introduction

The so far known fauna of dragonflies (Odonata) of Novosibirskaya Oblast, West Siberia, did not include the species *Anax imperator* Leach in Brewster, 1815 [Kosterin, Onishko 2021; 2025], although another species of the same genus, *Anax parthenope* (Selys, 1839), was reported from Lake Fadikha in Chanovskii District by a larva [Popova, Haritonov, 2012]. Besides, both these species were reported from Altaiskii Krai [Borisov, 2021], and the latter also from Kemerovskaya [Dronzikova, 2011] and Omskaya [Kosterin, 2007a] Oblasts, the regions bordering Novosibirskaya Oblast. Unexpectedly, not less than three males of *A. imperator* were observed and registered photographically on July 7–17 2025 in Novosibirskii and Iskitimskii Raions of Novosibirskaya Oblast, situated to the east of the Ob' River. No collecting was made and possible since the species is protected at the country level as included into the Red Data Book of Russian Federation [Volkova, Sobolev, 2021]. The locality in Novosibirskii District was monitored quite permanently but the species did not re-appear there. Details and interpretation are provided below.

Materials and Methods

Males of *A. imperator* were unexpectedly encountered on odonatological examination of water bodies, including a regular monitoring of two ponds in Vostok Garden Partnership near Novosibirsk Academy Town (Novosibirskii Raion). They were observed visually and photographed with the a Sony Cyber-shot DSC-RX10 camera, not so good for photography in flight or from distance. The photographs were submitted as photographic observations to iNaturalist [2021, 2023] (see also the research grade observations from there adopted by Global Biodiversity Informational Facility (GBIF) [iNaturalist, 2021, 2023]). They can be retrieved by substitution a specific observation number x (an integer value of 9 digits) into the following link template: https://inaturalist.org/observation/x. These iNaturalist observation numbers are provided below in parentheses. The same internet resource was used

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to assess occurrence of the species in neighbouring regions of West Siberia.

The present work is registered in ZooBank (www.zoobank.org) under urn:lsid:zoobank.org:pub:872DA3F5-881A-4AE0-9DF0-6768052D0283

Results

Anax imperator Leach in Brewster, 1815

Figs 1–3.

Photographic records. Novosibirskaya Oblast, Novosibirskii District, Novosibirsk Academy Town E environs, the upper of the two ponds on the brook being the Zyryanka River left tributary in Vostok Garden Fellowship, 54.8298° N, 83.1449° E, h~182 m a.s.l., 7.VII.2025, O. Kosterin — 1♂ (296070500) (Fig.1); Iskitimskii District, the NW bank of the big pond in Shibkovo village, 54.4975° N, 83.2947° E, h~164 m a.s.l., 10.VII.2025, O. Kosterin — 1♂ (303675439) (Fig. 2); Iskitimskii District, the broad outlet of the Koynikha Rivulet from the big pond in Shibkovo village, 54.4965° N, 83.2919° E, h~163 m a.s.l., 10.VII.2025, O. Kosterin — 1♂ (303675463) (Fig.3).

Visual sighting. Novosibirskaya Oblast, Iskitimskii District, 1 km SSE of Shibkovo village, a small pond on the Koynikha Rivulet, 54.4855° N, 83.3105° E, 178 m a.s.l., 17.VII.2025, O. Kosterin — 1♂.

Observations. The above mentioned pond (large, ca 200 × 80 m, deep and clear, mostly with clear firm banks with some bushes) near Novosibirsk Academy Town have been being monitored by me for three years by visiting it roughly once a week in good weather throughout the warm season. Having arrived to it at 14:47 on 7.VII.2025, I immediately recognised a male of *A. imperator* (well known to me from my experience in Europe, mostly in Russia, the Caucasus, and even in Eithopia), with the characteristic green thorax, bright-blue abdomen and slightly brownish-enfumed wings, which patrolled the surface of the pond near the dam, ca 1 m above the water, without regular trajectory and not keeping to the banks but sometimes approaching them, which is the characteristic reproductive behaviour of males of this species. Its appearance and behaviour well differed from those of the aeshnids common in Novosibirskaya Oblast. The male sometimes had conflicts with a male of *Orthetrum cancellatum* (Linnaeus, 1758) which occupied a small area of crushed pale stone on the bank. I was there for exactly 30 minutes; when the sun hid behind the clouds, the *A. imperator* male disappeared, but reappeared at the same place together with sunlight, when I managed to take some mediocre photos of its flying using a camera in general too slow for this purpose (Fig. 1). I had no net with me but, although collecting this protected species was impossible, it would worth taking a close-up photo in hands for better registration. I returned with a net 45 minutes later but, although the weather was the same intermittingly sunny, the Blue Emperor was no longer there. I revisited this pond on

Figs 1–3. Field photographs of males of *Anax imperator* Leach in Brewster, 1815 from Novosibirskaya Oblast. 1 — Novosibirsk Academy Town E environs, 296070500; 2 — Iskitimskii District, the NW bank of the pond in Shibkovo village, 303675439; 3 — the outlet of the Koynikha Rivulet from the above mentioned pond, 303675463.

Рис. 1–3. Полевые фотографии самцов *Anax imperator* Leach in Brewster, 1815, в Новосибирской области. 1 — восточные окрестности Новосибирского Академгородка, 296070500; 2 — Искитимский район, СЗ берег пруда в с. Шибково, 303675439; 3 — место истечения р. Койниха из вышеупомянутого пруда, 303675463.

9th, 11th, 14th and 16th of July, and later since mid-August, but did not observe this magnificent species.

Three days after the first finding, on 10.VII.2025, I encountered two more males of *A. imperator* 39 km SSE of the previous place, at the very big (1700 m long and 380 m wide at the broadest place) pond on the Koynikha Rivulet in Shibkovo village. At 12:43 I startled a male from a stretch of concrete at its NW bank, close to the river outlet. It immediately started to slowly range to and from above a small bay of water between the bank and a cattail (*Typha angustifolia* L.) thicket. This time I could make only some bad photos out of focus (Fig. 2) but had a net with me, nevertheless I somehow missed a sure strike. After this the male passed the cattail thicket three more times and disappeared. For an hour before and once after this I observed supposedly the same insect very seldom passing over the water behind the cattail thickets at banks but these sightings were not confirmed in any way.

Surprisingly, 42 minutes after the previous one, I found another male in 170 m, at a broad (ca 20 m) reach of the Koynikha Rivulet just under its re-appearing from the dam which formed the pond. It several time passed for long distances along the water and landed onto a cattail stem, allowing me to take the best of my bad pictures of this species (Fig. 3), from quite a distance.

I managed to revisit this pond on 17.VII.2025. At the pond itself I several times saw big dragonflies passing which could be *A. imperato*r (at least one male and one female) but these sightings contre-ajouré were too uncertain. A more confident visual observation of a male was made on a smaller pond downstream, where at ca 15:20–15:35 a male patrolled its bay margined with cattail thickets, disappearing behind them for many minutes and then re-appearing. Later it flew for some time high above the ground road and eventually disappeared. The sightings of this day were not confirmed objectively.

Thus, my observations of *A. imperator* in Novosibirskaya Oblast were made in ca 40 km from each other and to the south of Novosibirsk, and took place for an eleven day long period of 7–17th of July, while on 19th of July I left Novosibirsk for three weeks. Expectedly, no *A. imperator* was observed in August.

Discussion

Until the publication by Borisov [2021], all records of the genus *Anax* from Siberia concerned *Anax parthenope* only. This was not surprising since this species is well known as an eager migrant for long distances [Onishko, Kosterin, 2021]. The first record was made by Ivan B. Knor in 1970 at the Lake Ubsu-Nur northern bank near the Mongolian border in the current Tyva Republic, later updated with findings in four more localities in the same Republic in 2004 by the author of this paper [Kosterin, Zaika, 2010]. Next, Belyshev and Belyshev [1974] reported a teneral male collected on 9.07.1991 at Lake Aya, which is in the current Altai Republic. Quite a number of findings of this species were made in 1994–1997 in Novokuznetsk and Tashtagol, Kemerovskaya Oblast [Dronzikova, 2011]. Then a larva of this species of the penultimate stage was found on 1.10.2004 in Lake Fadikha, Chanovskii Raion of Novosibirkaya Oblast [Popova, Haritonov, 2012]. Then a teneral male of *A. parthenope* was collected in 2007 in Omsk, Omskaya Oblast [Kosterin, 2007a]. Lastly, the species was found in 2020 in two closely situated localities in Rubtsovskii and Loktevskii Districts of Altayskii Krai [Borisov, 2021]. In additions to these records published in scientific literature, iNaturalist [2021] contains the following four photographic observations of *A. parthenope* from the West and Central Siberia, all made in this 2025 year: a male from the Vympel village environs in Rubtsovskii District, 4.VI.2025, by Valeriy K. Lunev (observation 286989000), a male from the Alambay village environs, District of the same Altaikskii Krai (the Salairskii Kryazh Range), 6.IX.2025, by Lola Smirnova (observation 311920197); a female (dark morph) in Abakan City, Republic of Khakasia, 37.VI.2025, by Leonid Grishaev (observation 294290122), and a copula from Lake Khadyn, Tandinskii District of Tyva Republic, 19.VI.2025, by Olga Fattakhova (observation 301145319).

The hereby reported first record of in Novosibirskaya Oblast was of another species of the same genus, which is not considered as tending to long migrations [Kalkman, Proess, 2015], *A. imperator*. Since its first record by Sergey N. Borisov [2021], together with *A. parthenope* in the same two localities in Loktevskii and Rubtsovskii Districts of Altaiskii Krai, no further report of this species from Siberia have been published. Beyond the here reported ones, iNaturalist [2021] possesses only two observations of *A. imperator* from Siberia, both from the same Altaiskii Krai: a male from the above mentioned Vympel village environs of the same Rubtsovskii District, 8.VI.2025, by Dmirtiy Veretel'nikov (observation 286989000), and a male from Smirnen'koe village, Klyuchevskoi District, 12.VI.2022, by Ilya Sukhov (observation 124537924). Thus, all available information characterised *A. imperator* as confined in Siberia to the southern Altayskii Krai only, which made striking its here reported observations in the forest-steppe zone of Novosibrskaya Oblast, 2° northerly than the last mentioned locality.

Yet in view of the absence of observations of *A. imperato*r before and after these observations, in spite of a great attention paid to dragonflies of Novosibirsk surroundings by the author and other enthusiasts, the nearly simultaneous appearance of several individuals in 40 km from each other can be interpreted as an evidence of an irregular short-term invasion of *A. imperator* at least to the eastern Novosibirskaya Oblast, supposedly from the south. It is noteworthy that all the three males well observed and poorly photographed had darkened wings, that is were well mature. This irregular invasion also may be considered as a 'vanguard' of a slow northwards expansion of this species in Siberia, alike in Europe, which will be soon followed by establishing its permanent populations in Novosibirskaya Oblast.

It should be mentioned that *A. imperator* is included into the current Red Data Book of Russian Federation [Volkova, Sobolev, 2021] with category 5 — restoring species. This was inherited from its previous edition [Kharitonov, 2001], where it was included with category 2 — depleting species. The reason of that inclusion was the apparent depletion of this species in the European part of Russia in the preceding decades, especially in the North Caucasus and Moscow surroundings, supposedly due to water pollution and pesticide use. However that trend, if any, did not proceed in the 21st century but changed to the species' expansion, including in the mentioned regions. In fact, *A. imperator* is one of the most successful dragonfly species on this planet. It ranges in the entire Africa, most of Europe (except for most of Scandinavia and the northern Russia), and in most West Asia, north to almost entire Kazakhstan and east to the Hindukush and Himalaya. In its range it is always common to numerous, is able to breed in any water body except for fast rivers, either natural or arificial [Kalkman, Proess, 2015], and currently demonstrates northwards expansion in Europe [Kalkman, Proess, 2015], including the European Russia and Ural [Onishko et al., 2026]. Hence this species by no means deserves the protection, and is classified as Least Concerned in the IUCN Red List. As a member of an Expert Section on Terrestrial Invertebrates at the Commission on Rare and Threatened Animals, Plants and Fungi, in 2019 I made quite efforts attempting to exclude this species from the Red List of Russia, but these attempts failed. Since *A. imperator* remained in the Red Data Book of Russian Federation [Volkova, Sobolev, 2021], for formal reason it should be included also in the forthcoming edition of the Red Data Book of Novosibirskaya Oblast.

On the occasion of the here reported new dragonfly finding, I find it useful to provide the current list of odonate species (with subspecies where clear) so far registered in Novosibirskaya Oblast, based on Kosterin et al. [2001], Kosterin [2007b; 2013; 2015; 2020], Popova and Eremina [2016], Popova and Haritonov [2020], Kosterin and Onishko [2021; 2025] and now including 62 species (there are few changes in taxonomic treatments compared to the previous version of the list by Kosterin and Onishko [2021] mostly following Onishko et al. [2022]; Kosterin [2023] and Kosterin et al. [2025]): *Lestes barbarus* (Fabricius, 1798), *L. dryas* Kirby, 1890, *L. macrostigma* (Eversmann, 1836), *L. sponsa* (Hansemann, 1823), *L. virens vestalis* Rambur, 1842, *Sympecma paedisca* (Brauer, 1877), *Calopteryx splendens* (Harris, 1780), *Coenagrion armatum* (Charpentier, 1840), *C. glaciale* (Hagen in Selys & McLachlan, 1872), *C. ecornutum* (Selys, 1872), *C. hastulatum* (Charpentier, 1825), *C. johanssoni* (Wallengren, 1894) *C. lunulatum* (Charpentier, 1840), *C. puella* (Linnaeus, 1758), *C. pulchellum* (Vander Linden, 1825), *Enallagma cyathigerum rotundatum* Bartenef, 1929, *Erythromma najas najas* (Hansemann, 1823), *Ischnura elegans* (Vander Linden, 1820), *I. pumilio* (Charpentier, 1825), *Nehalennia speciosa* (Charpentier, 1840), *Platycnemis pennipes* (Pallas, 1771), *Aeshna affinis* Vander Linden, 1820, *A. caerulea* (Ström, 1783), *A. crenata* Hagen, 1856, *A. grandis* (Linnaeus, 1758), *A. juncea juncea* (Linnaeus, 1758), *A. serrata* Hagen, 1856, *A. soneharai* Asahina, 1988, *A. subarctica* Walker, 1908, *A. viridis* Eversmann, 1836, *Anax imperator* Leach in Brewster, 1815, *A. parthenope* (Selys, 1839), *Gomphus vulgatissimus* (Linnaeus, 1758), *Nihonogomphus ruptus* (Selys & Hagen, 1858), *Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785), *O. obscurus* Bartenev, 1909, *Shaogomphus postocularis epophthalmus* (Selys, 1872), *Stylurus flavipes* (Charpentier, 1825), *Cordulia aenea aenea* (Linnaeus, 1758), *Epitheca bimaculata* (Charpentier, 1825), *Somatochlora arctica* (Zetterstedt, 1840), *S. exuberata* Bartenev, 1910, *S. flavomaculata* (Vander Linden, 1825), *S. metallica* (Vander Linden, 1825), *Macromia fraenata* Martin, 1907, *Leucorrhinia albifrons* (Burmeister, 1839), *L. caudalis* (Charpentier, 1840), *L. dubia* (Vander Linden, 1825), *L. pectoralis* (Charpentier, 1825), *L. rubicunda* (Linnaeus, 1758), *Libellula quadrimaculata* Linnaeus, 1758, *Orthetrum brunneum* (Fonscolombe, 1837), *O. cancellatum* (Linnaeus, 1758), *Pantala flavescens* (Fabricius, 1798), *Sympetrum croceolum* (Selys, 1883), *S. danae* (Sulzer, 1776), *S. depressiusculum* (Selys, 1841), *S. flaveolum* (Linnaeus, 1758), *S. fonscolombii* (Selys, 1840), *S. pedemontanum pedemontanum* (Müller in Allioni, 1766), *S. sanguineum* (Müller, 1764), *S. vulgatum vulgatum* (Linnaeus, 1758). The overwhelming majority of them, 57 species, have also been registered in the Novosibirsk City limits; the remaining five species still not found there are *C. glaciale, A. caerulea, A. imperator*, *A. parthenope* and *O. obscurus*.

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